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ABSTRACT

This unit is designed to provide driver educators with information for teaching automobile drivers about the traffic-mix problem between bicycles and motor vehicles on roadways. The purpose of the unit is to improve the safety of bicyclists on North Carolina highways and help to decrease the number of bicycle deaths and injuries caused by traffic accidents. Material is divided into two parts. Each part begins with a list of objectives followed by informative material. Part 1 covers historical relationships between the automobile and bicycle; cycle uses, cyclists, and behavior characteristics; and types of bicycles. Part 2 concerns bicycles as factors in traffic accidents, the most common automobile/bicycle accidents, bicycle-initiated accidents, and automobile driver-initiated accidents. Transparency masters are provided that reinforce classroom instruction. A list cites additional resources that would be helpful for teaching bicycle safety in a driver education class. Other references are also listed. (YLB)

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A North Carolina Driver Education Handbook

Bicycles in Traffic

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Bicycles in Traffic

INTRODUCTION

The bicycle boom is here to stay and tantamount to the vast increase of two-wheeled vehicles is the traffic-mix problem evident between the bicycles and motor vehicles on our roadways. Each year over one thousand bicyclists are fatally injured and thousands more are seriously injured because of traffic accidents nationally. North Carolina added 21 fatalities and 1,063 injuries to these national figures in 1977. Although North Carolina has achieved reductions recently in fatalities over past years, the number of injuries has continued to increase.

Much of the bicycle/automobile conflict can be based upon the lack of awareness and acceptance of the bicycle as an equal partner in the traffic flow by automobile drivers. National Safety Council statistics suggest that most bicycle/automobile collisions are legally the fault of the bicyclists. However, this does not discount the fact that the automobile driver has a great responsibility to perceive possible conflicts and take appropriate actions to avoid a collision. This is especially true because of the greater roadway control capabilities of the automobile as compared with the bicycle.

Driver educators can contribute significantly to increasing safety for bicyclists and awareness of bicyclists by drivers by including this unit dealing with the automobile/bicycle mix in their program. Its appropriate use will improve the reguiar driver education course by identifying the traffic behavior of bicyclists and increasing the visual perceptions of automobile drivers. The ultimate purpose of this unit is to improve the safety of bicyclists on North Carolina highways and help to decrease the number of bicycle deaths and injuries caused by traffic accidents.

It is with this purpose in mind that the following information was developed for the use of driver educators. The information is logically and sequentially written and intended to be a unit which can be easily understood and freely disseminated to students. Visual masters which can be used for the reproduction of information in order to reinforce classroom instruction are included in the handbook. Resource references are also included for the same purpose. The unit will fit into the driver education program wherever the teacher deems it appropriate, possibly when dealing with motorcycle safety.

However, it is strongly emphasized that this unit is not for the purpose of teaching bicycle safety for bicycle riders. This unit is primarily for the benefit of automobile drivers.

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PART I

OBJECTIVES

1. To place the bicycle and automobile in their proper historical perspective.

2. To document specific physical relationships of the automobile to the bicycle.

3. To show the chronological development of the bicycle as a forerunner of the automobile.

4. To describe the tremendous growth in popularity of the bicycle.

5. To document evidence that the bicycle will remain a part of the American transportation system.

6. To list purposes why people use bicycles in the traffic flow.

7. To identify the various types of bicycles that will be seen on the roadways.

HISTORICAL RELATIONSHIPS BETWEEN THE AUTOMOBILE AND BICYCLE

Early history of the bicycle reveals it to be a closely related forerunner of the automobile and a very important link in the development of the automobile.

The first bicycle was described as a very crude and inefficient vehicle. However, the design was soon improved and the bicycle became a very popular mode of transportation. The need for a larger vehicle with increased speed to accommodate both driver and passengers logically brought about the necessity of a four-wheeled vehicle. Therefore, many bicycle manufacturers were also the first to begin building automobiles. In fact, Charles Duryea, who designed the first American car in 1893, was a skilled bicycle mechanic, and Alexander Winston, a bicycle manufacturer, produced the first American high-performance car, a 12-horsepower model that recorded a speed of 33.7 miles per hour in 1897. Henry Ford made extensive use of bicycle parts, including the seat, when constructing his first car in 1896. The chain drive and pneumatic tire were also features invented for the bicycle, which were incorporated in the automobile.

History also shows us that the bicycle was an increasingly popular means of transport prior to the coming of the automobile. With the introduction of the "horseless carriage" and the subsequent building of automobile highways, the bicycle began sharing the roads with the automobile. However, no significant move was immediately made to make this safe for the bicycle. Not until the National Uniform Vehicle Code specified that bicycles be ridden according to the same traffic laws as those governing operation of automobiles did the automobile driver and the bicylist have guidelines for operating their vehicles together.

The Motor Vehicle Laws of North Carolina apply to the bicycle as well as to automobiles, trucks, and motorcycles.

SIGNIFICANT DATES

Some of the most notable dates depicting the first development of the bicycle prior to the automobile are:

1816–German Baron Earl Von Drais invents the forerunner of the bicycle.

1821–In England, Lewis Gompertz improves on Von Drais' idea.

1835–Scotsman Kirkpatrick MacMillian gives the bicycle its first foot pedals on the front wheels.

1869–The first bicycle is introduced to the United States.

1872–The English "Penny-Farthing" is invented with its large diameter front wheel for more speed.

1876–Col. Albert A. Pope, in Massachussets, begins the first American production of the bicycle.

1880–The League of American Wheelmen is formed in Newport, Rhode Island. This is the first American bicycle organization.

1884–Thomas Stevens is the first man to cross the United States on a bicycle.

1885–Englishman J.K. Starley invents the first chain driven "Safety Bicycle".

1888–In Ireland, Dr. J.B. Dunlop invents the first air-filled pneumatic tire for the bicycle.

In 1816, in Germany, Baron Karl Von Drais invented the first bicycle. Called the "Hobby-Horse or Draisene", it consisted of a wooden frame, wooden wheels and an uncomfortable saddle. There were no pedals on this first model but the machine was pushed with the feet. Then in England, in 1821, Lewis Gompertz invented a rack-and-pinion steering device whereby the handlebars could be turned with the hands while the feet remained on the ground pushing. The resultant ease of maneuverability allowed the rider to go faster and farther. Fourteen years later, in 1835, Kirkpatrick MacMillan installed the first foot pedals on the front wheels of a bicycle in Scotland. This made bicycling the fad of the continent. Originally viewed as an expensive playtoy for the rich, the bicycle became widely accepted through Europe.

In 1869, the first bicycle was introduced to America, from England, where it was fondly called the "boneshaker". It was made from wood with iron-rimmed wooden wheels with front pedals. Needless to say, it was very uncomfortable to operate. An outgrowth of the boneshaker was the English "Penny-Farthing". It was a designer's attempt to gain more speed from the bicycle. It had a large-diameter front wheel, which gave the bicycle more speed, but it was also very difficult to ride because of a balance problem. In the United States, this bicycle was called the "ordinary". In 1876, Col. Albert A. Pope imported the "Penny-Farthing" and began mass production of this model in Boston, Massachusetts, at a cost of about $150 each.

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The League of American Wheelmen was formed in 1880 in Newport, Rhode Island. This was the first bicycle organization in the United States. This organization of bicycle riders published its own maps and list of lodgings for cyclists, lobbied for better road conditions, and provided other important information for its member riders.

Thomas Stevens was the first person to ride a bicycle across the United States. This feat, performed in 1884, took 103½ days on a high-wheeler that weighed 75 pounds. Contrast this with the accomplishment of Richard Berg who performed the cross-country trip in just 14 days in 1954 on a much lighter bicycle.

In 1885, Englishman J.K. Starley invented the "safety bicycle". This pedacycle had a chain-driven rear wheel and solid rubber tires with 30-inch-diameter wheels. It was called the "rover". This bicycle was not necessarily safer than others but it was much easier to ride and much more comfortable.

Then, in 1888, Dr. J.B. Dunlop invented something that lead to tremendous advances in wheeled transportation. In Ireland, Dunlop invented the air-filled pneumatic tire for the bicycle. This allowed for a comparatively comfortable ride for the driver. By 1891, the pneumatic tire was an accepted bicycle feature.

Although this information may seem irrelevant to automobile drivers, it vividly depicts the early continuing struggle for a better and more efficient vehicle for travel by man. The early history of the bicycle shows the sequential improvement of the two-wheeled vehicle which ultimately led to a motorized four-wheeled vehicle.

It is believed that this historical information describing the development of the bicycle will give motorists a better basis for acceptance of the bicycle through an understanding of the early relationship of the two vehicles.

THE BICYCLE IS HERE TO STAY

Sales Figures. The popularity of the bicycle began growing in the United States in the late 1800's. Between 1880 and 1890 there were approximately 200,000 bicycles in this country. From 1890 to 1896, about $100 million was spent on bicycles. The average cost of a bike then was $80 to $100. In 1897, around 2 million bicycles were sold. This averaged out to approximately 27.7 bicycles per 1,000 people in this country.

Upon the arrival of the automobile in the early 1900's, bicycle sales dropped off greatly. People were beginning to buy the new-fangled, four-wheeled vehicle. During the Depression, there were comparatively few bicycles sold. However, in 1933, after the initial effects of the Depression, 250,000 bicycles were sold and a new wave of buying began. In 1940, more than one million were sold. Annual post World War II sales reached the 2.8 million mark. With the increase in sales, more bicycle manufacturing firms began operation. In 1960, sales figures climbed to 3.7 million per year with an estimated 23.5 million riders. The vast majority of these were younger children, ages 5 to 15. There were approximately 100 bicycle manufacturers in the United States and half again as many in other countries in the world.

There were 13.5 million bicycles sold in the United States in 1972. This figure represents 64.9 bicycles per 1,000 people, or one bicycle for each 2.6 persons. During that year, there were an estimated 80 million bicycles on the streets and highways of America. Bicycle sales topped the sale of automobiles for the first time in 1972 and have continued to do so each year since. Today, there are an estimated 100 million bicycle riders riding approximately 91 million bicycles. It is con-

servatively estimated that 2,100,000 of these riders are in North Carolina. Of the 91 million bicycles estimated to be in the United States, 7.5 million were produced in this country and 1.9 million were imports. The dramatically increased adult interest in bicycling has caused the largest gains in production recently. About 5 million lightweight bicycles with wheel sizes ranging from 24" to 27" were bought in 1977, an increase of about one million from the previous year. Sales figures are projected to reach the 10.5 million to 11 million mark in 1978 and there is no indication that sales will decline in future years.

This synopsis of sales and rider information dramatically confirms the fact that the bicycle is firmly implanted in the lives of Americans of all ages and will continue to be so. Therefore, automobile drivers must prepare themselves to share the roadways with bicyclists in a safe, efficient, acceptable manner which is advantageous to both groups.

RIDERS AND THEIR BICYCLES

Automobile drivers must learn to accept bicyclists as partners in the traffic flow on our roadways if their vehicles are to become more compatible during the traffic mix. Learning more about the characteristics of riders and their bicycles can bring about a better understanding of the cyclists by the automobile drivers. The following information categorizes and describes both bicycle riders and their bicycles.

People use the bicycle for a variety of reasons. These uses have been grouped into six general categories:

1. Play
2. Errands
3. Touring and recreation
4. Exercise
5. Commuter transportation
6. Racing

Each of these categories represents a different type of cyclist with certain behavioral characteristics. The automobile driver should be able to identify the cyclists in order to mix safely in the traffic flow.

Use	Cyclists	Behavior Characteristics
1. Play	Kid-Novice	Tends to ignore traffic laws. May be an unstable rider.
2. Errands	Any age	Has trouble operating in traffic. Tends to move slowly.
3. Touring or Recreation	Adult	Keeps constant speeds. Luggage may hamper control.
4. Exercise	Adult	Usually operates in groups. Forgets to check traffic or traffic controls.
5. Commuter	Adult	Keeps a rapid pace on heavily traveled roads. Reacts to traffic more than to traffic controls.
6. Racing	Adult	Stays with pace of traffic. Will travel on smoothest surface of road.

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Child riders used to comprise over 75% of the bicycle users in America. They used their bikes mostly for play but also for running errands, delivering newspapers, working as delivery people for stores and transporting themselves from place to place.

Since the energy shortage in 1973, more adults have purchased bicycles. Current sales figures indicate that almost 70% of the new bikes purchased are bought by those aged 18 and over. Adult riders generally use their bicycles for recreation or exercise for the most part; however, an increasing number are using bicycles for transportation to and from work and for errands, etc. In the mid-1970's many Americans became interested in physical fitness. The result was a boom in bicycle sales from 1972 to the present.

The gasoline shortage in 1973 brought about a great influx of people into the traffic flow who were riding their bicycles to and from work. A 1975 Gallup Poll indicated that 5% of the working force in America made trips to and from work on a bicycle.

There are several reasons for the increase in bike usage across this country. Some of these are:

1. There has been an increase in casual recreation among Americans.
2. Bicycles do not cost as much to buy and operate as do automobiles.
3. There are more people commuting to work from the suburbs than before.
4. The energy shortage, especially of gasoline, has frightened people into using their cars less.
5. There has been a physical fitness boom in this country. Bicycling is a way to get good physical exercise.

Sizes of bicycles. There are five general types or sizes of bicycles:

1. The high-rise
2. The standard
3. The lightweight
4. The tandem
5. The adult tricycle

High-rise bikes are designed for fun. They have shorter wheelbase, smaller wheels, high handlebars and a long banana seat. They enable the driver to make quick turns and do trick maneuvers. The **standard** is strong and durable and weighs about 50 pounds. They have large low pressure tires and coaster brakes. The **lightweight** is designed for persons looking to gain endurance through easy pedalling. They have thin, high-pressure tires and low handlebars for touring. They are lightweight and are equipped with varying speed capabilities depending on the model. Gearing variance is designed for power on hills and for speed on straight, level roads. The **tandem** is a bicycle built for two with two seats, two sets of pedals, and two sets of handlebars (only one of which actually steers the bike). The **adult tricycle** is designed for the fully-grown rider who prefers stability and steadiness. This three-wheeled tricycle enables the rider to carry packages in a basket mounted between the two rear wheels.

Wheel Sizes	Type Bicycle
20" - 24"	High-rise, Standard, Tandem
24" - 27"	Lightweight, Tandem, Adult Tricycle

PART II

OBJECTIVES

1. To explain the automobile driver's responsibilities toward bicyclists in traffic.
2. To explain the bicyclist's responsibilities in traffic.
3. To describe the six major automobile/bicycle accident types.
4. To explain what automobile drivers can do to help prevent automobile/bicycle accidents.

BICYCLES AS FACTORS IN TRAFFIC ACCIDENTS

A major problem on our highway system today is the difficulty encountered when automobiles and bicycles must mix. Motorists must be educated to coexist safely with bicycles in traffic. In order to do so, motorists must be aware of the capabilities and limitations of bicycle riders in traffic. As motorists learn to include bicycles as legitimate vehicles in traffic, automobiles and bicycles will be better able to mix. Car drivers should know what a safe driver should do when encountering bicycles in the traffic flow.

CYCLISTS AND THE HANDLING CHARACTERISTICS OF BICYCLES

Drivers need to be aware that bicyclists can and do have problems with balance and stability. Bicylists carrying packages may have a balance or handling problem which causes them to maneuver suddenly. Bicycle riders, especially young riders, often carry passengers, thus making the bicycle unstable and difficult to maneuver. The automobile driver can help prevent collisions by realizing that a bicycle can be maneuvered very quickly and easily and anticipating a quick, unexpected swerve into his intended path of travel. Equipment failure may also cause a bicyclist to make an unexpected manuever in traffic. In some cases the bicyclist may also be riding too fast to make evasive manuevers.

VISIBILITY

Visibility is a serious problem when the motorist must mix with bicycles. The small outline a bicycle presents to the driver makes it difficult to distinguish from the surrounding environment. Automobile drivers must "think small" because bicycles are small. The best way for drivers to "see" bicyclists is to "think" bicycle when scanning the driving scene.

The visibility problem is compounded greatly at night. Although North Carolina law requires all bicycles ridden at night be equipped with a front light visible for at least 300 feet and a rear light or reflector visible for at least 200 feet, many bicycles are ridden with improper lights or no lights at all. Bicycles ridden at night without proper lighting and the "invisible" bicyclists who do not wear bright-colored clothing may blend into the background and are difficult, if not impossible, to detect. Drivers must learn to search the traffic scene for bicycles, mentally as well as physically. Drivers who do not "think" bicycle are likely to overlook an otherwise visible bicycle in the traffic flow.

NOTE TO TEACHER: TO STRESS THE POINT THAT BICYCLES ARE DIFFICULT TO SEE IN TRAFFIC, YOU MAY WANT TO USE SLIDES OF BICYCLES IN ACTUAL TRAFFIC SCENES.

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BICYCLE RIDER BEHAVIOR

Drivers must be prepared for the unexpected, unsafe or illegal behavior of some bicyclists. The safe driver is aware of the fact that some bicyclists illegally ride against the flow of traffic or suddenly change lane position. The driver should compensate for this behavior by scanning the roadway from sidewalk to sidewalk when looking for potential traffic hazards. Some bicyclists, especially young riders, are ignorant of traffic laws, fail to signal turns, and fail to obey signs and signals, and therefore, do not always do what motorists expect.

Also, the actions of some bicyclists may not be illegal but certainly are unsafe. Bicyclists who emerge from driveways or alleys suddenly without warning or who approach intersections riding on the sidewalk and suddenly swerve out into the street pose definite hazards. A bicyclist may try to take advantage of his smaller size and pass a line of cars from the right rear as they wait for a right turn. The good driver must be alert to such behavior and take the responsibility to avoid a collision.

THE MOST COMMON AUTOMOBILE/BICYCLE ACCIDENTS

According to a National Highway Traffic Safety Administration study, there are more than 30 different types of automobile/bicycle accidents. These can be grouped into six general classifications which account for 85% of the fatal and 90% of the injury accidents involving automobiles and bicycles. These six accident classifications are listed below and illustrated on the following pages.

Class A. The bicyclist unexpectedly rides out into the traffic flow from some midblock location, such as an alley, a driveway or just over the curb and into the street.

Class B. The bicyclist rides out into cross traffic at an intersection controlled by a signal light or traffic sign.

Class C. The automobile enters the traffic flow from a driveway or alley, or from a cross street controlled by a stop sign.

Class D. The automobile overtakes the bicyclist from behind and attempts to pass.

Class E. The bicyclist makes an unexpected left turn or swerves into the path of the automobile.

Class F. The automobile makes an unexpected or unsignaled turn into the bicyclist's right-of-way.

Three of these six are primarily initiated by unsafe or illegal actions on the part of the bicyclist and three are the result of unsafe or illegal behavior by the automobile driver.

NOTE TO TEACHER: THESE ARE TWO DISTINCTLY DIFFERENT ACCIDENT-CAUSING FACTORS. IT SHOULD BE STRESSED TO STUDENTS THAT EACH REQUIRES A DIFFERENT KIND OF DRIVER ACTION TO AVOID A COLLISION.

Regardless of who is at fault, the bicyclist is much more likely to be injured in a collision and the automobile driver must therefore assume extra responsibility for avoiding the collision. North Carolina law recognizes the bicycle as a legitimate vehicle on the roadway and the automobile driver must treat it with the same courtesy and respect as any other vehicle.

NOTE TO TEACHER: THIS CONCEPT IS BASIC TO THE BICYCLE PROBLEM AND MUST BE STRESSED THROUGH THE UNIT.

BICYCLIST-INITIATED ACCIDENTS

Automobile drivers should learn to anticipate the following accident situations caused by bicyclists.

MIDBLOCK BICYCLE RIDE-OUT (CLASS A)

This type of collision usually occurs on non-congested two-lane residential streets. In most cases, the bicyclist rides straight out into traffic from a driveway or alley and is struck by a vehicle approaching from the bicyclist's left. Parked cars near driveways and alleys may cause additional problems by obstructing the driver's view of the bicycle. Many times this type of accident involves young bicycle riders who are distracted by companions or game-playing and do not look for cars when entering the street. The automobile driver must look from sidewalk to sidewalk when scanning the driving scene and anticipate the sudden appearance of bicycle riders, especially in residential areas.

INTERSECTION BICYCLE RIDE-OUT (CLASS B)

Another frequent type of accident occurs when a bicyclist fails to slow down or stop at an intersection and is struck by a vehicle approaching from the left. Bicyclists, like car drivers, fail to slow or stop for a variety of reasons including not seeing a sign, hurry, or lack of attention. Most of the bicyclists who fail to stop are young riders under sixteen, and drivers must anticipate this type of action from young riders.

The automobile driver must learn to scan the approaching intersection for bicyclists as well as cars. When a driver sees bicyclists approaching an intersection, he should anticipate that the rider may not stop or yield the right-of-way and begin accident avoidance procedures such as slowing his car and using the horn to gain the bicyclist's attention.

UNEXPECTED LEFT SWERVE/TURN BY BICYCLIST (CLASS E)

A large number of fatal and injury accidents occur when a bicyclist suddenly swerves left into the path of an overtaking vehicle. In most cases the automobile driver sees the bicyclist ahead but does not expect and therefore is not prepared for the sudden left swerve. Also, the bicyclist rarely scans to the rear before making the swerve.

Again, the reasons for a sudden swerve by a bicyclist are many. Some of the frequent causes include: debris in the bicyclist's path which may not be a problem to cars, an improperly placed sewer drain, or a dog. The automobile driver who looks for and anticipates problems faced by the bicyclist will not be caught off-guard by the sudden left swerve.

NOTE TO TEACHER: IT IS SUGGESTED THAT THESE ACCIDENT SITUATIONS BE EXPLAINED AND DISCUSSED USING TRANSPARENCIES OR SLIDES FOR CLARIFICATION.

AUTOMOBILE DRIVER-INITIATED ACCIDENTS

Not all automobile/bicycle accidents are caused by the bicyclist. Many such accidents occur when the bicyclist is riding safely and observing all laws and the automobile driver acts unsafely or illegally. Automobile drivers must take extreme care and caution to avoid unsafe or illegal manuevers that create conflict situations with any vehicles, including bicycles. Some of the most common types of automobile-initiated collisions are described below.

MOTORIST TURN/MERGE AT A DRIVEWAY, ALLEY OR CONTROLLED INTERSECTION (CLASS C)

Many automobile/bicycle collisions occur at intersections when the driver is making a turn and fails to see an approaching bicycle rider. In many cases the driver scans appropriately for other cars but either fails to see the bicyclist or does not scan all areas where bicycles may appear. A bicyclist may be riding on the sidewalk or on the wrong side of the street, making it necessary for the automobile driver to scan these areas as well as normal traffic lanes. Right turns by automobiles from driveways, alleys or at intersections are especially dangerous to bike riders. This type of collision usually does not involve a driver who fails to stop at an intersection, but rather one that has complied with the law and then mistakenly determined that it was safe to proceed. Right turns on red are particularly dangerous because many times the bicyclist is between the car and the curb.

MOTORIST OVERTAKING AND PASSING A BICYCLE (CLASS D)

Overtaking and passing a bicycle or group of bicycles is potentially an extremely hazardous maneuver. Drivers need to realize the many possible hazards involved and approach the passing maneuver with extreme caution. The most prevalent type of overtaking accident occurs at night on rural roadways when the bicycle is unlighted or improperly lighted. Drivers should continuously search the gray area ahead of their headlights for early clues to bicycles.

NOTE TO TEACHER: THE IMPORTANCE OF SEARCHING AHEAD OF HEADLIGHT AREA SHOULD BE STRESSED WHEN TEACHING THE "OVERDRIVING HEADLIGHTS" CONCEPT.

Another common problem occurs when automobile drivers attempt to pass a bicycle without sufficient clearance on the right. North Carolina law requires a driver to leave two feet of clearance when passing another vehicle and this applies to bicycles as well as cars. Failure to do so can result in a violation for improper passing. When passing a bicycle, a driver should also move completely

into the adjoining lane to make a safe legal pass and prevent the wind draft from causing handling problems for the bicyclist.

UNEXPECTED MOTORIST TURN (CLASS F)

Drivers making left turns at intersections controlled by a traffic signal frequently fail to see a legally approaching bicycle and turn into the bicyclist's path. This type of accident occurs most frequently on multiple-lane streets where the driver has a more complex driving scene to search and identify. The bicycle riders usually do not take evasive action in time because they have assumed the driver sees them and will yield the right-of-way. Drivers need to be extra alert for bicycle riders, especially when turning on multi-lane streets.

Right turns at intersections by cars can also be dangerous to a bicycle driver. Bicycle riders sometimes ride between a line of cars in the right lane and the curb creating a dangerous situation at intersections. When making a right turn, drivers should be extra alert for this situation and check the rear view mirror and right blind spot thoroughly before beginning. Drivers who pass a bicyclist in traffic and then make a right turn should be sure to locate the bicyclist again before beginning the turn. Also, a driver should never speed around a bicyclist and then immediately make a right turn. The safe driver will allow the bicyclist to pass the intersection and then complete his right turn.

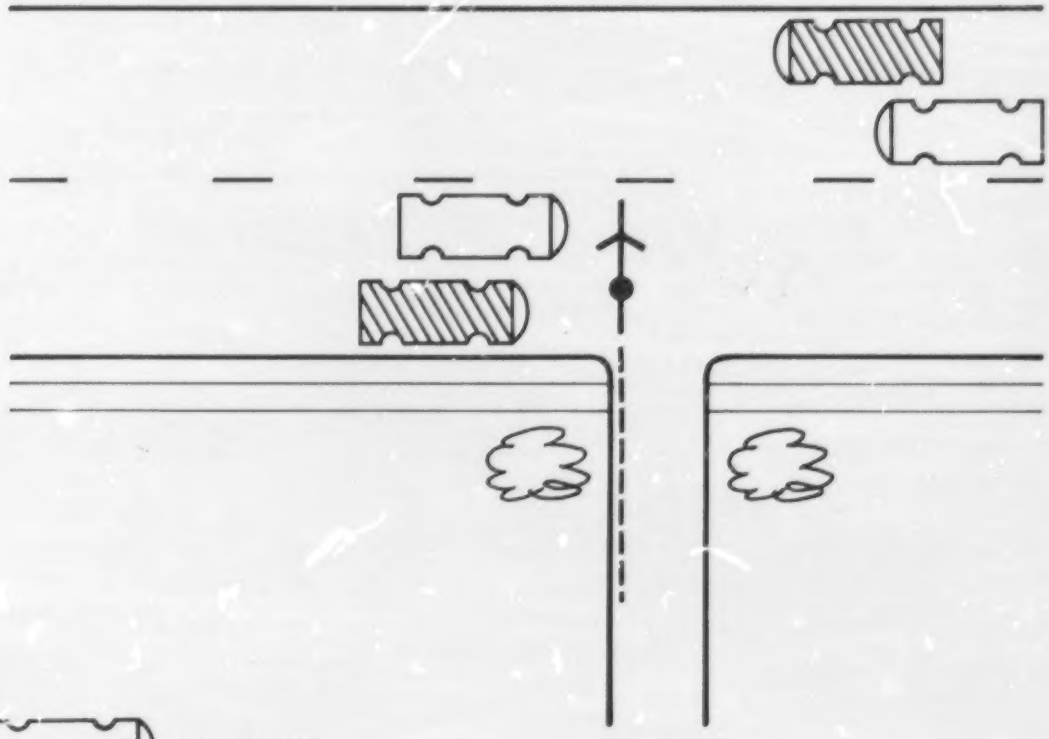
SUMMARY

Automobile/bicycle accidents are caused by both the automobile driver and the bicyclist. The driver can do a number of things to help prevent this type of collision.

1. Remember that bicycles are legal vehicles on the roadway and treat them as such.
2. Look for and anticipate problems of bicyclists when encountering them in traffic.
3. Fully scan the driving scene and remember to include bicycles in your search.
4. Also establish eye contact with the bicyclist. Tap your horn lightly and early, and avoid loud horn blowing that may startle a bicyclist into a sudden move.
5. Be alert for traffic violations by bicyclists such as riding on the wrong side of the road, no lights at night, and improper turning or swerving.
6. Reduce your speed when approaching any bicycle.
7. When passing a bicycle, leave sufficient space and watch for wind drafts.
8. Make it easy for other motorists to see bicycles when preparing for turns.
9. Signal all your turns to tell cars and bicycles what you intend to do.

CLASS A ACCIDENT, BICYCLE RIDEOUT: driveway, alley and other mid-block areas

A-1 Left approach, 72% of BICYCLE RIDEOUT accidents.



Moving vehicle

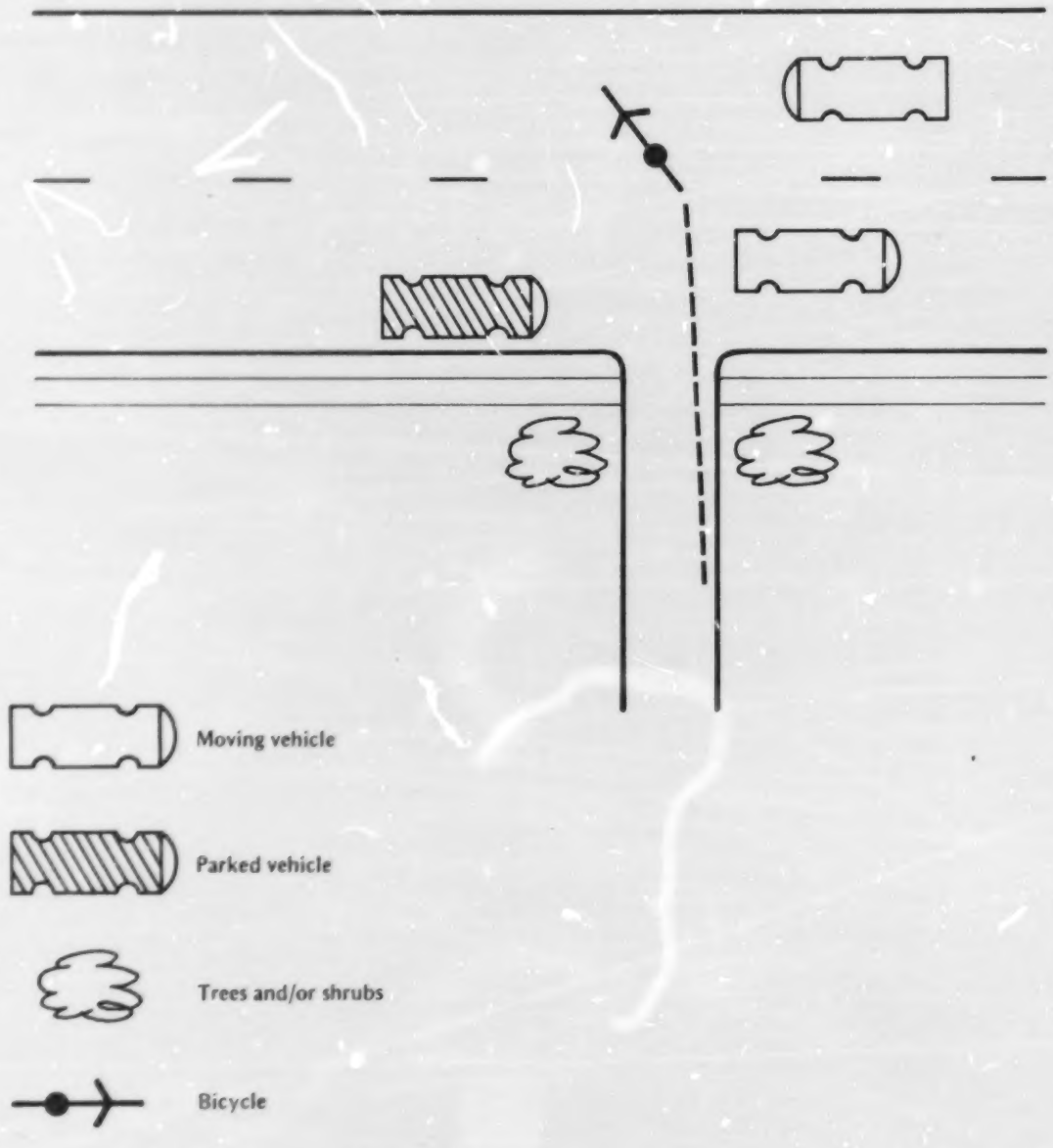
Parked vehicle

Trees and/or shrubs

Bicycle

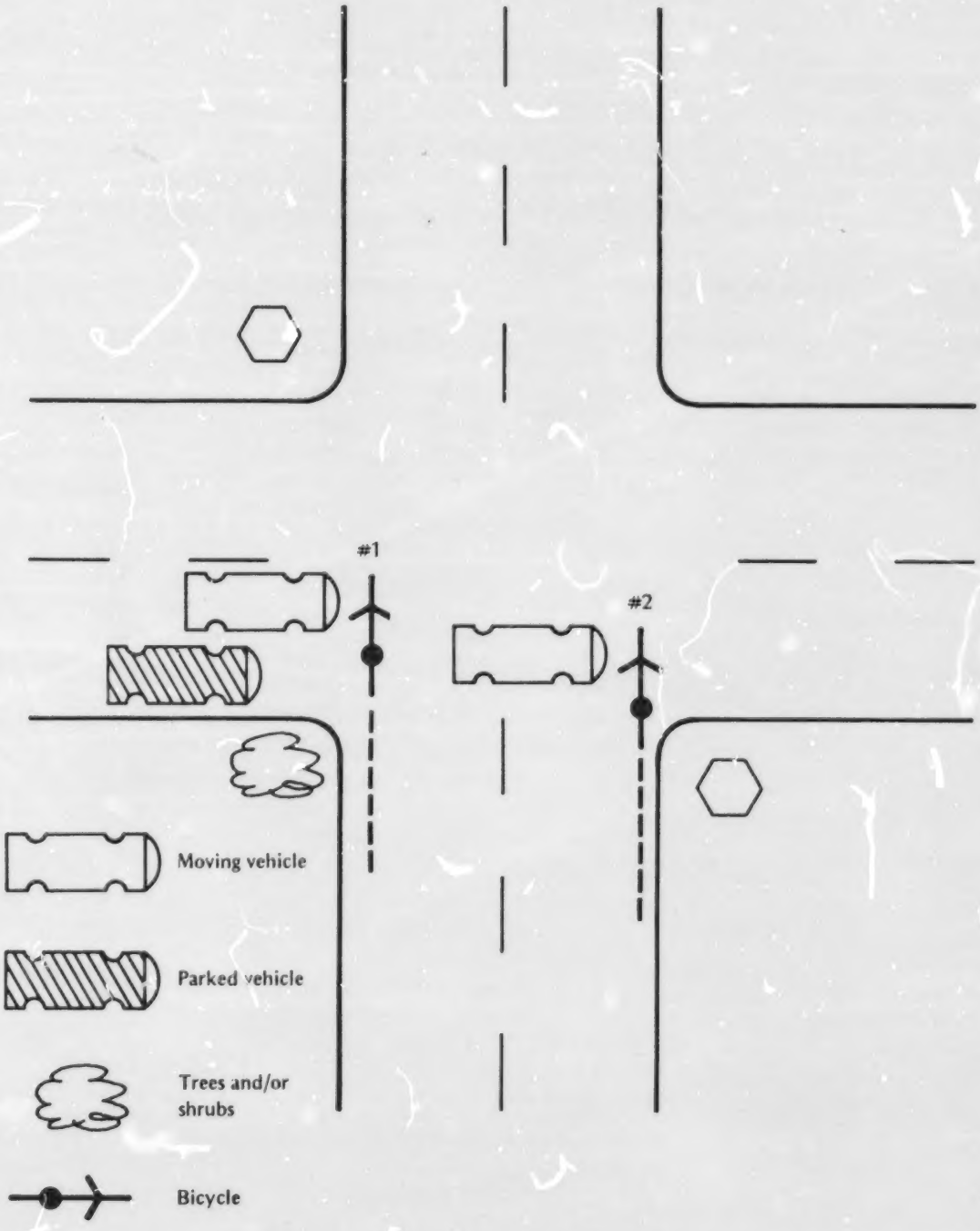
CLASS A ACCIDENT, BICYCLE RIDEOUT: driveway, alley and other mid-block areas

A-2 Right approach, 28% of BICYCLE RIDEOUT accidents.



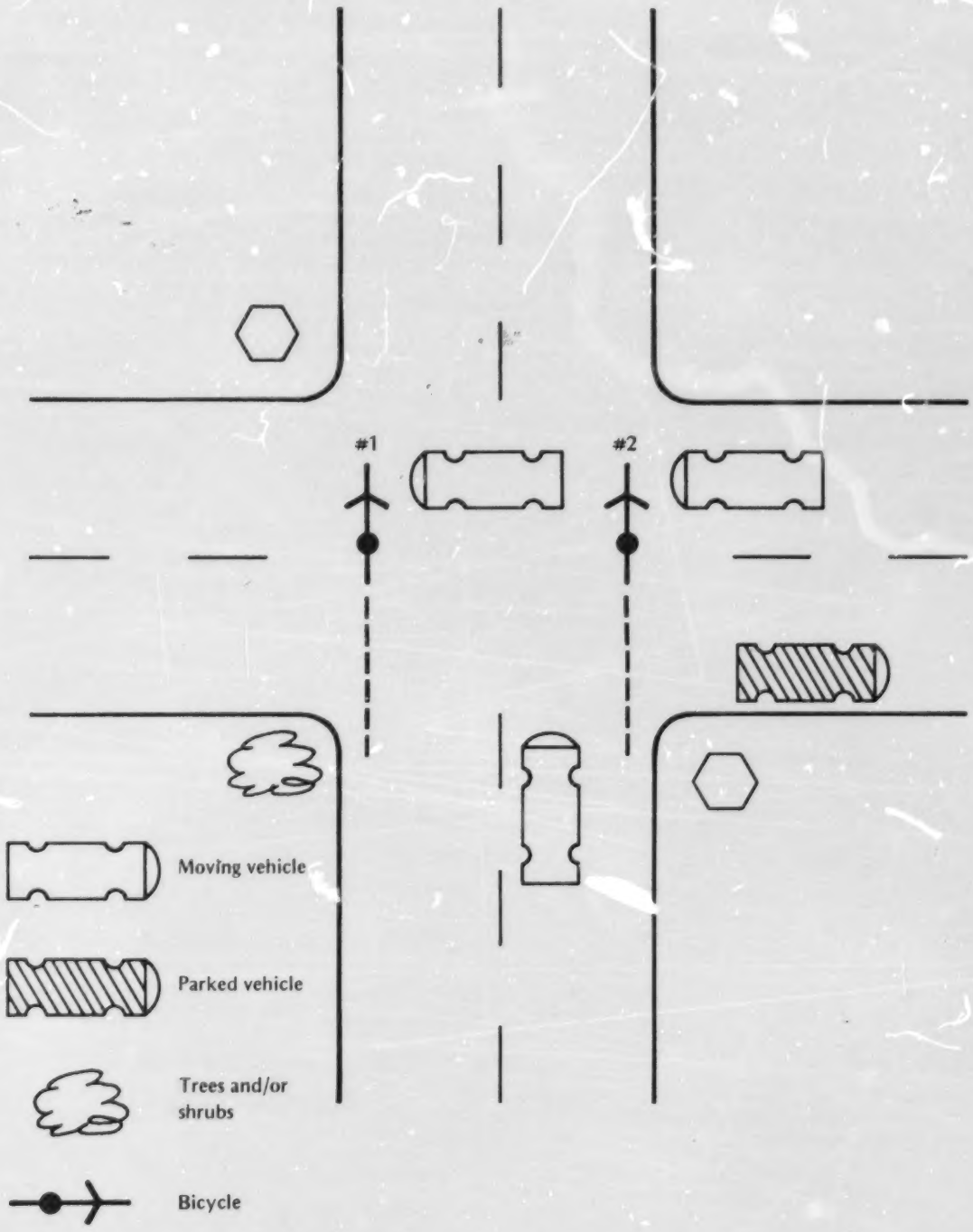
CLASS B ACCIDENT, BICYCLE RIDEOUT: controlled intersections

B-1 Left approach, point #1, 22.0%
Left approach, point #2, 43.0%



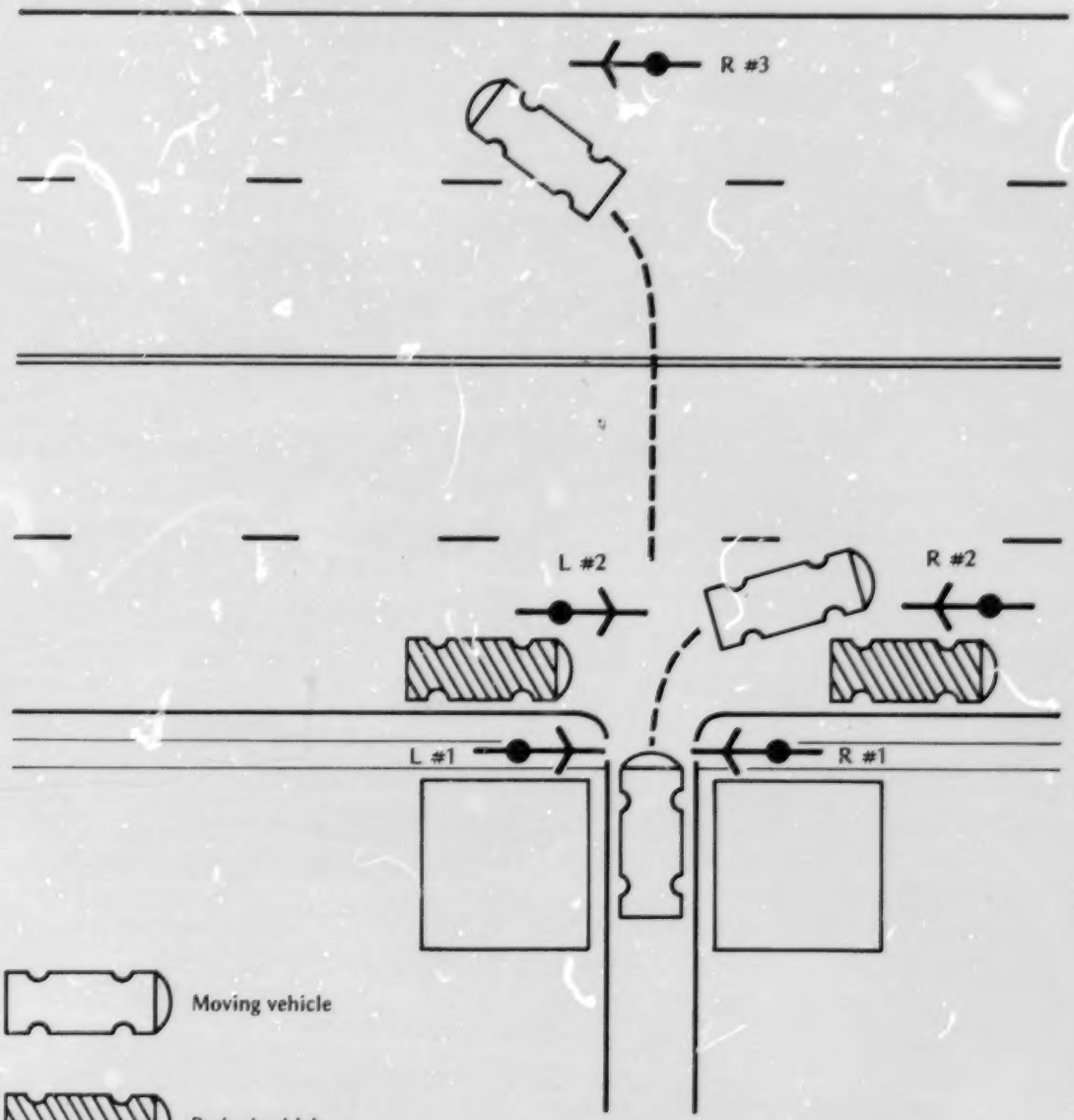
CLASS B ACCIDENT, BICYCLE RIDEOUT: controlled intersections

B-2 Right approach, point #1, 1.0%
Right approach, point #2, 28.0%



CLASS C ACCIDENT, MOTORIST TURN/MERGE: driveway or alley

C-1 Commercial driveway and alley



Moving vehicle

Parked vehicle

Building

Bicycle

Left approach #1, 5.0%
Left approach #2, 22.5%
Right approach #1, 32.5%
Right approach #2, 30.0%
Right approach #3, 10.0%

CLASS C ACCIDENT, MOTORIST TURN/MERGE/CROSSOVER:

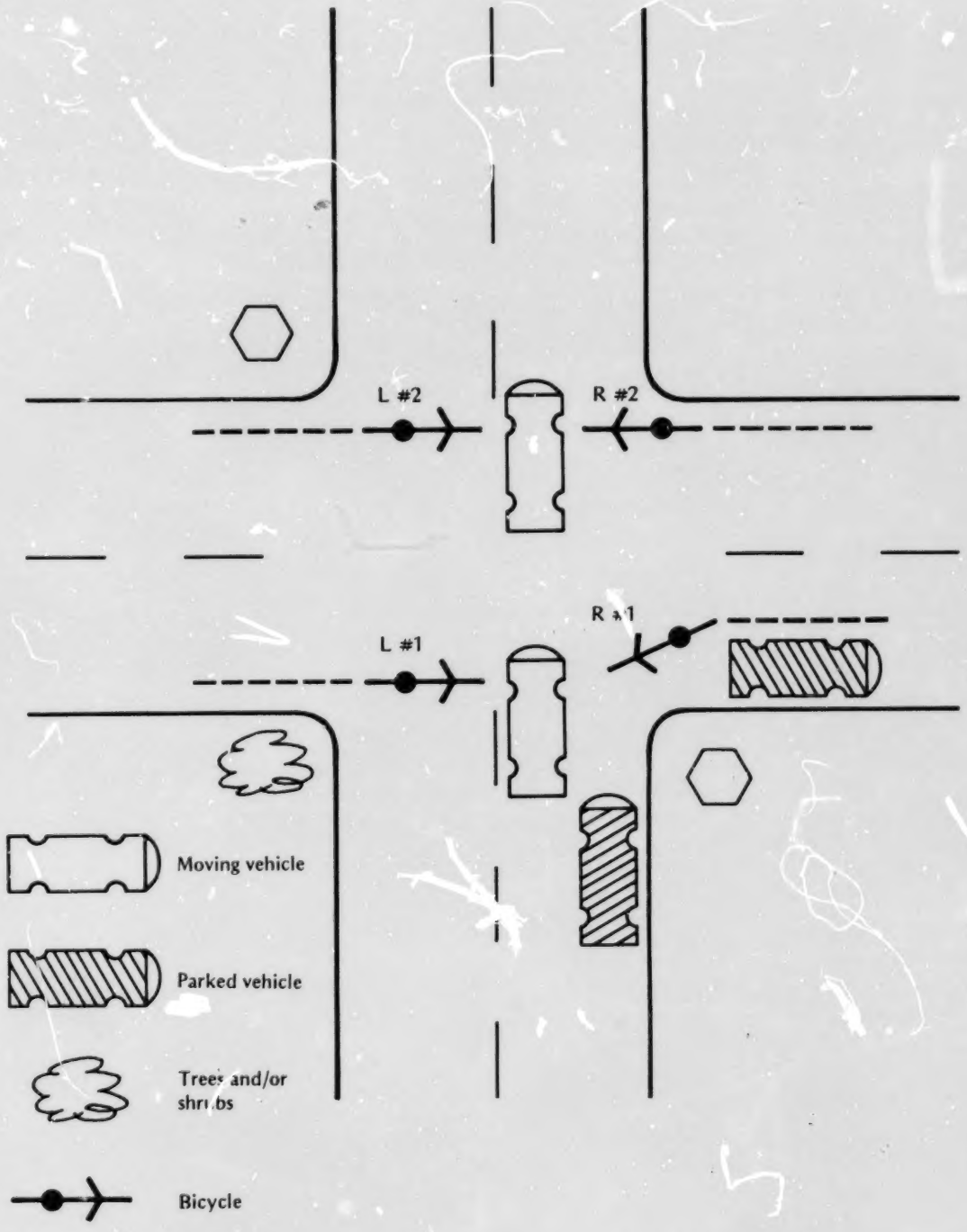
C-2 Intersection crossover, controlled

Left approach #1, 22.0%

Left approach #2, 8.0%

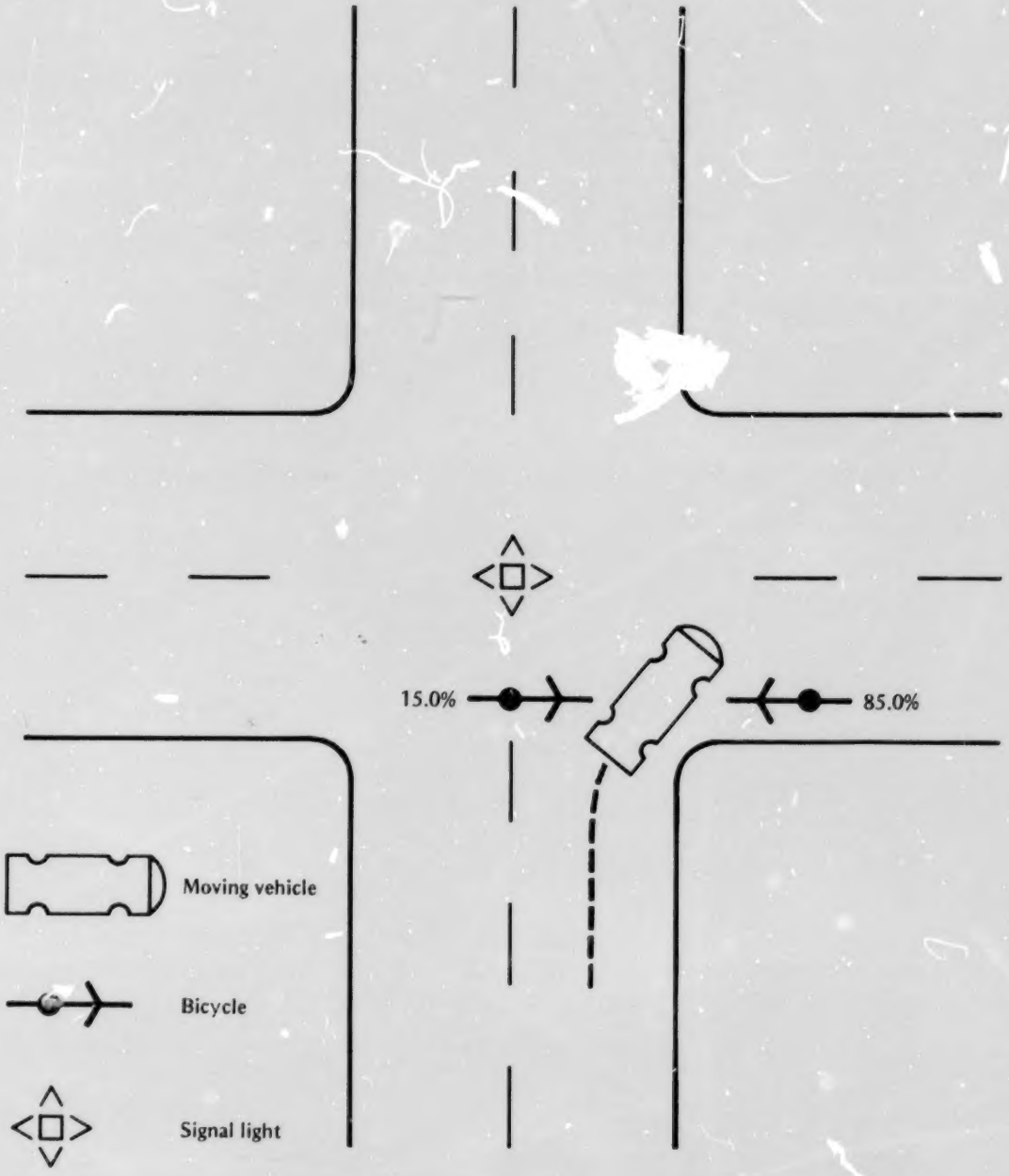
Right approach #1, 54.0%

Right approach #2. 16.0%



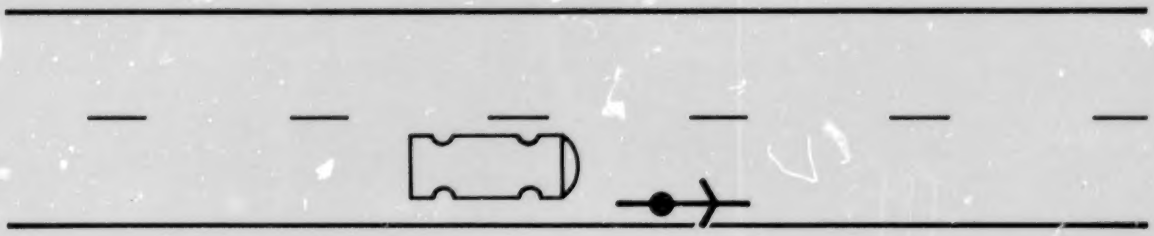
CLASS C ACCIDENT, MOTORIST TURN/MERGE/CROSSOVER:

C-3 Intersection controlled by signal

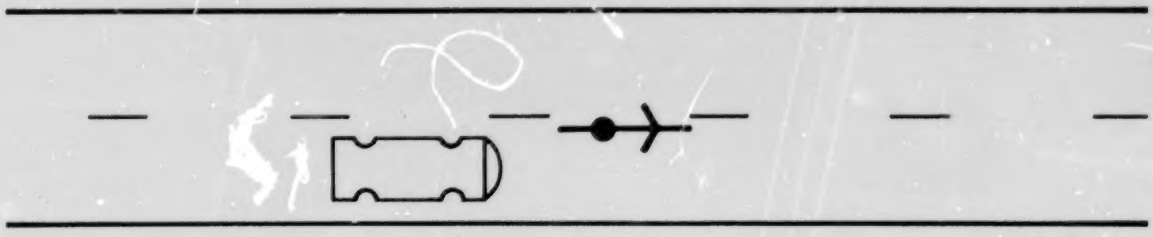


CLASS D ACCIDENT, MOTORIST OVERTAKING BICYCLE:

D-1 Bicyclist not detected



D-2 Judgment and evasive action

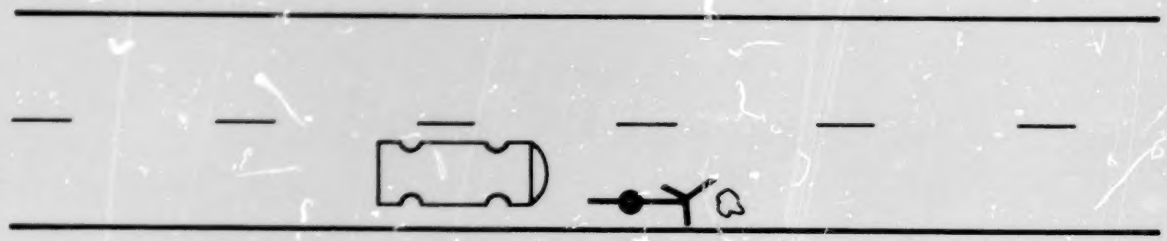


Moving vehicle

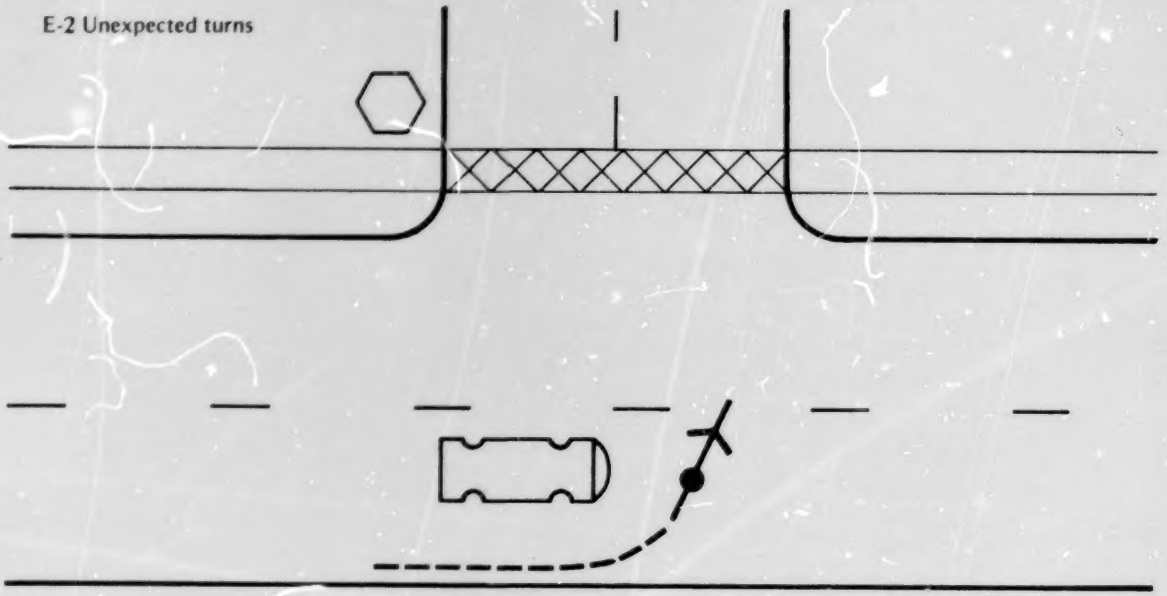
Bicycle

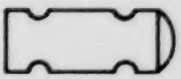
CLASS E ACCIDENT, BICYCLIST UNEXPECTED SWERVE/TURN:

E-1 Unexpected swerves

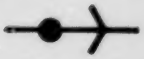


E-2 Unexpected turns





Moving vehicle



Bicycle

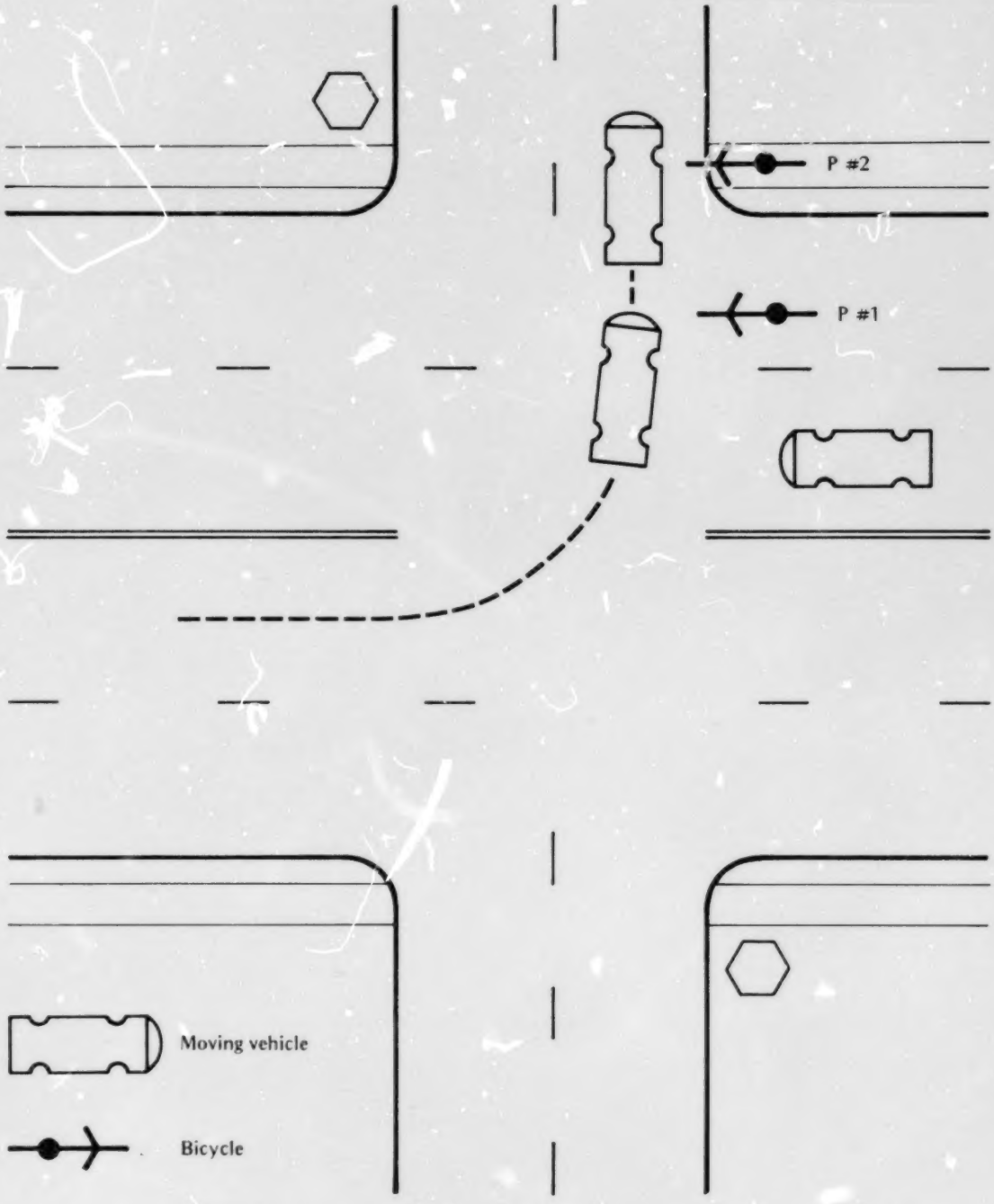
Rock

CLASS F ACCIDENT, MOTORIST UNEXPECTED TURN:

F-1 Motorist unexpected left turn

Point #1, 86.0%

Point #2, 14.0%

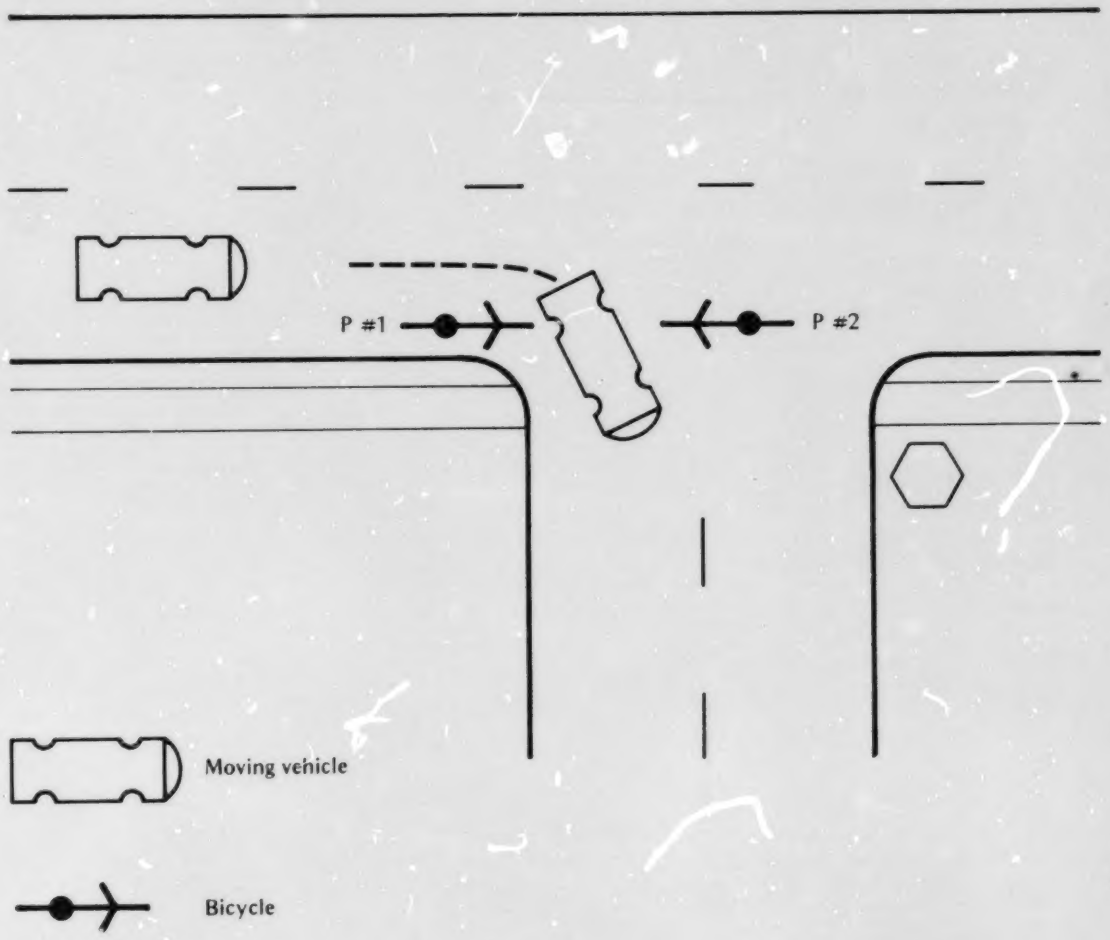


CLASS F ACCIDENT, MOTORIST UNEXPECTED TURN:

F-2 Motorist unexpected right turn

Point #1, 74.0%

Point #2, 26.0%



RESOURCES FOR TEACHING BICYCLE SAFETY

Editor's Note: The most comprehensive and reliable bicycle safety resource materials in North Carolina are located at the North Carolina Department of Transportation, Bicycle Program Office, Post Office Box 25201, Raleigh, North Carolina 27611.

The following listings are additional resources which would be helpful when teaching about bicycle safety in a driver education class. Although most of the references listed were developed for bicyclists, there are traffic safety sections in each.

Audio-Visual

"Just Like a Car"
Film Loop, Inc.
P.O. Box 2233
Princeton, New Jersey 08540

"Bicycle Rules of the Road"
AIMS Instructional Media Services, Inc.
P.O. Box 1010
Hollywood, California 90028

"Bicycle Safety–You Can Prevent an Accident"
Lee Stanley Films
17215 Bullock Street
Encino, California 91316

"Bicycle Today–Automobile Tomorrow"
Youth Guidance Films
Sid David Productions
1046 South Robertson Blvd.
Los Angeles, California 90035

Audio-Visual Services
Aetna Life and Casualty Company
151 Farmington Avenue
Hartford, Connecticut 06115

"Only One Road"
AAA Foundation for Traffic Safety
8111 Gatehouse Road, Room 328
Falls Church, Virginia 22042

Your local McDonald's Restaurant

Books

The Bike Book
Author: Bibs McIntyre
Pyramid Communications, Inc.
919 Third Avenue
New York, New York 10022

The New Complete Book of Bicycling
Author: Eugene Sloan
Trident Press
630 Fifth Avenue
New York, New York 10029

Pamphlets and Booklets

"A Bicycle Built for You"
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Stock Number: 052-011-00141-4

Organizations Publishing Bicycle Safety Literature

American Automobile Association
8111 Gatehouse Road
Falls Church, Virginia 22042

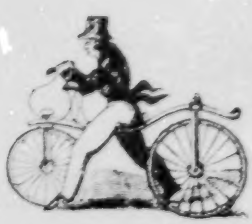
American Driver and Safety Education Association
1201 Sixteenth Street, NW
Washington, D.C. 20036

U.S. Consumer Products Safety Commission
Washington, D.C. 20207

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

National Safety Council
444 N. Michigan Avenue
Chicago, Illinois 60611

Bicycle Manufacturers Association
1101 15th Street, NW
Washington, D.C. 20005



REFERENCES

1. "A Review of the 1977 Bicycle Market." Bicycle Manufactures Association of America, Inc., January, 1978.

2. Bicycle Safety Atlas, ed. Vince Darago. Urban Scientific and Educational Research, Inc. Washington, D.C., for the National Highway Traffic Safety Administration, 1978.

3. Bicycle Safety Education: A Guide to Resources and Materials. U.S. Department of Transportation and the U.S. Consumer Products Safety Commission, Washington, D.C. 1977.

4. Bicycle Safety Highway Users Information Report, by Bruce Burgess and Dan Burden for the National Highway Traffic Safety Administration, Washington, D.C. 1977.

5. Cleckner, Robert M. "A Long Look at Bicycle Safety." Journal of Traffic Safety Education, Vol. XXIII, No. 1, p. 12.

6. Cross, K.D. "Bicycle/Motor Vehicle Accident Types." Santa Barbara, California, Anacapa Sciences, Inc. 1977.

7. Cross, K.D. "Identifying Critical Behavior Leading to Collisions Between Bicycles and Motor Vehicles," Santa Barbara, California, Anacapa Sciences, Inc. 1974.

8. Frankel, Godfrey. Bike-Ways (New York: Sterling Publishing Company, Inc., 1950).

9. Hodge, Bruce E. and Laurie J. Mcintosh. "A[illegible] Specific Critical Behaviors of Bicyclists in California Bicycle/Motor Vehicle Collissions." Journal of Traffic Safety Education, Vol. XXV, No. 1., October, 1977, pp. 19-20.

10. The Kentucky Bicycle Driver's Guide, Kentucky Department of Transportation and Department of Education, 1977.

11. Morse, Herbert W. "Bicycle Safety - Education, Enforcement and Laws." Journal of Traffic Safety Education, Vol. XIV, No. 3, April, 1977, p. 124.

12. North Carolina K-9 Traffic Safety Curriculum, North Carolina Department of Public Instruction. September, 1974.

13. North Carolina Traffic Accident Summary, North Carolina Department of Transportation, Division of Motor Vehicles, 1978.

14. Overend, Robert B. "Young Adults on Bikes - An NSC Study." Traffic Safety, October, 1976, pp. 22-24+.

15. "Safety Benefits of Bike Lanes Noted in Journal Article." Traffic Safety. February, 1977, p. 16+.

16. Sloane, Eugene A. The New Complete Book of Bicycling (New York: Simon and Schuster, 1974).

17. Thompson, Ronald L. "Pedestrian and Bicycle Safety as it Relates to Driver Education." Division of Highway Safety, Madison, Wisconsin, 1975.

18. Walsh, Lawrence B. "A Bit of Rationality About Bike Education." Journal of Traffic Safety Education, Vol. XXI, 2, January, 1974, pp. 15-16.